

**WHAT IS CLAIMED:**

1. A belt press for a paper machine, the belt press comprising:  
a roll comprising an exterior surface;  
a permeable belt comprising a first side and being guided over a portion of said exterior surface of said roll;  
said permeable belt having a tension of at least approximately 30 KN/m;  
said first side having an open area of at least approximately 25% a contact area of at least approximately 10% , preferably a contact area of at least 25 %.
2. The belt press of claim 1, wherein said first side faces the exterior surface and wherein said permeable belt exerts a pressing force on said roll.
3. The belt press of claim 1, wherein said permeable belt comprises through openings.
4. The belt press of claim 1, wherein said permeable belt comprises through openings arranged in a generally regular symmetrical pattern.
5. The belt press of claim 1, wherein said permeable belt comprises generally parallel rows of through openings, whereby the rows are oriented along a machine direction.
6. The belt press of claim 1, wherein said permeable belt exerts a pressing force on said roll in the range of between approximately 30 KPa to approximately 150 KPa.

7. The belt press of claim 1, wherein said permeable belt comprises through openings and a plurality of grooves, each groove intersecting a different set of through openings.
8. The belt press of claim 7, wherein said first side faces the exterior surface and wherein said permeable belt exerts a pressing force on said roll.
9. The belt press of claim 8, wherein said plurality of grooves arranged on said first side.
10. The belt press of claim 7, wherein each of said plurality of grooves comprises a width, and wherein each of the through openings comprises a diameter, and wherein said diameter is greater than said width.
11. The belt press of claim 1, wherein said tension of said belt is greater than approximately 50 KN/m.
12. The belt press of claim 11, wherein said tension of said belt is greater than approximately 60 KN/m.
13. The belt press of claim 11, wherein said tension of said belt is greater than approximately 80 KN/m.
14. The belt press of claim 1, wherein said roll comprises a vacuum roll.
15. The belt press of claim 1, wherein said roll comprises a vacuum roll having an interior circumferential portion.

16. The belt press of claim 15, wherein said vacuum roll comprises at least one vacuum zone arranged within said interior circumferential portion.
17. The belt press of claim 1, wherein said roll comprises a vacuum roll having a suction zone.
18. The belt press of claim 17, wherein said suction zone comprises a circumferential length of between approximately 200 mm and approximately 2,500 mm.
19. The belt press of claim 18, wherein said circumferential length is in the range of between approximately 800 mm and approximately 1,800 mm.
20. The belt press of claim 19, wherein said circumferential length is in the range of between approximately 1,200 mm and approximately 1,600 mm.
21. The belt press of claim 1, wherein said permeable belt comprises at least one of a polyurethane extended nip belt and a spiral link fabric.
22. The belt press of claim 1, wherein said permeable belt comprises a polyurethane extended nip belt which includes a plurality of reinforcing yarns embedded therein and wherein said reinforcing yarns comprise at least one of mono yarns, twisted yarns, multifilament yarns, and a combination of mono yarns, twisted yarns and multifilament yarns.
23. The belt press of claim 22, wherein said plurality of reinforcing yarns comprise a plurality of machine direction yarns and a plurality of cross direction yarns.

24. The belt press of claim 1, wherein said permeable belt comprises a polyurethane extended nip belt having a plurality of reinforcing yarns embedded therein, said plurality of reinforcing yarns being woven in a spiral link manner.
25. The belt press of claim 1, wherein said permeable belt comprises at least one spiral link fabric which includes at least one of a synthetic material, a stainless steel material, and a combination of a synthetic material and a stainless steel material.
26. The belt press of claim 25, wherein said at least one spiral link fabric comprises a synthetic material.
27. The belt press of claim 25, wherein said at least one spiral link fabric comprises stainless steel.
28. The belt press of claim 1, wherein said permeable belt comprises a permeable fabric which is reinforced by at least one spiral link belt.
29. The belt press of claim 1, further comprising:
  - a first fabric and a second fabric traveling between said permeable belt and said roll;
  - said first fabric having a first side and a second side;
  - said first side of said first fabric being in at least partial contact with said exterior surface of said roll;
  - said second side of said first fabric being in at least partial contact with a first side of a fibrous web;
  - said second fabric having a first side and a second side;

said first side of said second fabric being in at least partial contact with said first side of said permeable belt; and  
said second side of said second fabric being in at least partial contact with a second side of said fibrous web.

30. The belt press of claim 29, wherein said first fabric comprises one of a permeable dewatering belt, a felt, a woven fabric, and a wire.
31. The belt press of claim 29, wherein said second fabric comprises one of a structured fabric and a TAD fabric.
32. The belt press of claim 29, wherein said fibrous web comprises a tissue web or hygiene web.
33. A fibrous material drying arrangement comprising:  
an endlessly circulating permeable extended nip press (ENP) belt guided over a roll;  
said ENP belt being subjected to a tension of at least approximately 30 KN/m;  
said ENP belt comprising a side having an open area of at least approximately 25% and a contact area of at least approximately 10% , preferably of at least 25 % .
34. A permeable extended nip press (ENP) belt which is capable of being subjected to a tension of at least approximately 30 KN/m, said permeable ENP belt comprising:  
at least one side comprising an open area of at least approximately 25% and a contact area of at least approximately 10% , preferably of at least 25 % .

35. The ENP belt of claim 34, wherein the open area is defined by through openings and the contact area is defined by a planar surface.
36. The ENP belt of claim 34, wherein the open area is defined by through openings and the contact area is defined by a planar surface without openings, recesses, or grooves.
37. The ENP belt of claim 34, wherein the open area is defined by through openings and grooves, and the contact area is defined by a planar surface without openings, recesses, or grooves.
38. The ENP belt of claim 34, wherein said permeable ENP belt comprises a spiral link fabric.
39. The ENP belt of claim 38, wherein said open area is between approximately 30% and approximately 85%, and said contact area is between approximately 15% and approximately 70%.
40. The ENP belt of claim 38, wherein said open area is between approximately 45% and approximately 85%, and said contact area is between approximately 15% and approximately 55%.
41. The ENP belt of claim 38, wherein said open area is between approximately 50% and approximately 65%, and said contact area is between approximately 35% and approximately 50%.
42. The ENP belt of claim 34, wherein said permeable ENP belt comprises through openings arranged in a generally symmetrical pattern.

43. The ENP belt of claim 34, wherein said permeable ENP belt comprises through openings arranged in generally parallel rows relative to a machine direction.
44. The ENP belt of claim 34, wherein said permeable ENP belt comprises an endless circulating belt.
45. The ENP belt of claim 34, wherein said permeable ENP belt comprises through openings and wherein said at least one side of said permeable ENP belt comprises a plurality of grooves, each of said plurality of grooves intersecting a different set of through hole.
46. The ENP belt of claim 45, wherein each of said plurality of grooves comprises a width, and wherein each of said through openings comprises a diameter, and wherein said diameter is greater than said width.
47. The ENP belt of claim 46, wherein each of said plurality of grooves extend into the permeable ENP belt by an amount which is less than a thickness of the permeable belt.
48. The ENP belt of claim 34, wherein said tension is one of greater than approximately 50 KN/m, greater than approximately 60 KN/m, and greater than approximately 80 KN/m.
49. The ENP belt of claim 34, wherein said permeable ENP belt comprises a flexible reinforced polyurethane member.

50. The ENP belt of claim 34, wherein said permeable ENP belt comprises a flexible spiral link fabric.
51. The ENP belt of claim 34, wherein said permeable EN P belt comprises a flexible polyurethane member having a plurality of reinforcing yarns embedded therein.
52. The ENP belt of claim 51, wherein said plurality of reinforcing yarns comprise a plurality of machine direction yarns and a plurality of cross direction yarns.
53. The ENP belt of claim 34, wherein said permeable ENP belt comprises a flexible polyurethane material and a plurality of reinforcing yarns embedded therein, said plurality of reinforcing yarns being woven in a spiral link manner.
54. The ENP belt of claim 34, wherein said permeable ENP belt comprises at least one spiral link fabric.
55. The ENP belt of claim 54, wherein said at least one spiral link fabric comprises a synthetic material.
56. The ENP belt of claim 54, wherein said at least one spiral link fabric comprises stainless steel.
57. The ENP belt of claim 34, wherein said permeable ENP belt comprises a permeable fabric which is reinforced by at least one spiral link belt.
58. A method of subjecting a fibrous web to pressing in a paper machine, the method comprising:



applying pressure against a contact area of the fibrous web with a portion of a permeable belt, wherein the contact area is at least approximately 10 % preferably at least approximately 25% of an area of said portion; and moving a fluid through an open area of said permeable belt and through the fibrous web, wherein said open area is at least approximately 25% of said portion,

wherein, during the applying and the moving, said permeable belt has a tension of at least approximately 30 KN/m.

- 59. The method of claim 58, wherein said contact area of the fibrous web comprises areas which are pressed more by said portion than non-contact areas of the fibrous web.
- 60. The method of claim 58, wherein said portion of the permeable belt comprises a generally planar surface which includes no openings, recesses, or grooves and which is guided over a roll.
- 61. The method of claim 58, wherein said fluid comprises air.
- 62. The method of claim 58, wherein said open area of said permeable belt comprises through openings and grooves.
- 63. The method of claim 58, wherein said tension is greater than approximately 50 KN/m.
- 64. The method of claim 63, wherein said tension is greater than approximately 60 KN/m.

65. The method of claim 64, wherein said tension is greater than approximately 80 KN/m.
66. The method of claim 58, further comprising:  
rotating a roll in a machine direction,  
wherein said permeable belt moves in concert with and is guided over or by said roll.
67. The method of claim 58, wherein said permeable belt comprises a plurality of grooves and through openings, each of said plurality of grooves being arranged on a side of said permeable belt and intersecting with a different set of through openings.
68. The method of claim 58, wherein said applying and said moving occur for a dwell time which is sufficient to produce a fibrous web solids level in the range of between approximately 25% to 55 %.
69. The method of claim 68, wherein said dwell time is one of equal to or greater than approximately 40 ms and equal to or greater than approximately 50 ms.
70. The method of claim 58, wherein said permeable belt comprises a spiral link fabric.
71. A method of pressing a fibrous web in a paper machine, the method comprising:  
applying a first pressure against first portions of the fibrous web with a permeable belt and a second greater pressure against second portions of the fibrous web with a pressing portion of the permeable belt, wherein an area of

the second portions is at least approximately 10 % preferably at least approximately 25% of an area of the first portions; and moving air through open portions of said permeable belt, wherein an area of the open portions is at least approximately 25% of the pressing portion of the permeable belt which applies the first and second pressures, wherein, during the applying and the moving, said permeable belt has a tension of at least approximately 30 KN/m.

72. The method of claim 71, wherein said tension is one of greater than approximately 50 KN/m, greater than approximately 60 KN/m, and greater than approximately 80 KN/m.
73. The method of claim 71, further comprising:  
rotating a roll in a machine direction, said permeable belt moving in concert with said roll.
74. The method of claim 71, wherein said area of the open portions is at least approximately 50% of the pressing portion.
75. The method of claim 71, wherein said area of the open portions is at least approximately 70% of the pressing portion.
76. The method of claim 71, wherein an average of a sum of said first pressure and said second greater pressure is in the range of between approximately 30 KPa to approximately 150 KPa.
77. The method of claim 71, wherein said moving and said applying occur substantially simultaneously.

78. The method of claim 7 1, further comprising moving the air through the fibrous web for a dwell time which is sufficient to produce a fibrous web solids in the range of between approximately 25% and approximately 55%.
79. The method of claim 7 8, wherein said dwell time is one of equal to or greater than approximately 40 ms and equal to or greater than approximately 50 ms.
80. The method of claim 7 1, further comprising applying, with a roll, a pressing force against the pressing portion of the permeable belt.
81. A method of drying a fibrous web in a belt press which includes a roll and a permeable belt comprising through openings, wherein an area of the through openings of a pressing portion of the permeable belt is at least approximately 25% of an area of the pressing portion, and wherein the permeable belt is tensioned to at least approximately 30 KN/m, the method comprising:  
guiding at least the pressing portion of the permeable belt over the roll;  
moving the fibrous web between the roll and the pressing portion of the permeable belt;  
subjecting at least approximately 10% of the fibrous web to a pressure produced by portions of the permeable belt which are adjacent to the through openings; and  
moving a fluid through the through openings of the permeable belt and the fibrous web.
82. The method of claim 8 1, wherein the permeable belt comprises grooves and wherein the subjecting comprises subjecting at least approximately 25% of the fibrous web to a pressure produced by portions of the permeable belt

which are adjacent to the through openings and the grooves.

83. The method of claim 81, wherein the permeable belt comprises a spiral link fabric.
84. The method of claim 81, wherein the portions of the permeable belt which are adjacent to the through openings comprises a contact area, and wherein the contact area is at least approximately 25% of the area of the pressing portion.
85. A pressing arrangement comprising:  
at least one first fabric;  
at least one second fabric;  
the at least one first fabric and the at least one second fabric being permeable;  
a paper web disposed between the first and second fabrics;  
a pressure producing element being in contact with the at least one first fabric;  
a support surface of a supporting structure being in contact with the at least one second fabric; and  
a differential pressure being provided between the first fabric and the support surface and acting on the at least one first fabric, the paper web, and the at least one second fabric, whereby the paper web is subjected to mechanical pressure and experiences a predetermined hydraulic pressure so as to cause water to be drained from the paper web;  
wherein the pressing arrangement is structured and arranged to allow air to flow in a direction from the at least one first fabric, through the paper web, through the at least one second fabric.

86. The arrangement of claim 85, wherein the at least one first fabric is a structured fabric and has at least one of a greater roughness and a lower compressibility than the at least one second fabric and wherein the pressing arrangement is structured and arranged to allow air to flow in a direction from the at least one first fabric, through the paper web, through the at least one second fabric, and at least one of through the support surface and into recesses in the support surface.
87. The arrangement of claim 85, wherein the at least one first fabric is a TAD fabric.
88. The arrangement of claim 85, wherein the at least one first fabric is a membrane.
89. The arrangement of claim 85, wherein the at least one first fabric is one of a printed membrane and a printed fabric.
90. The arrangement of claim 85, wherein the at least one second fabric includes a permeable base fabric and a lattice grid attached thereto and which is made of polymer such as polyurethane.
91. The arrangement of claim 90, wherein a lattice grid side of the at least one second fabric is in contact with the support surface of a suction roll while an opposite side of the at least one second fabric contacts the paper web.
92. The arrangement of claim 90, wherein the lattice grid is oriented at an angle relative to machine direction yarns and cross-direction yarns of the

permeable base fabric.

93. The arrangement of claim 90, wherein the lattice grid comprises an anti -rewet layer and a soft material layer which contacts the paper web.
94. The arrangement of claim 90, wherein the lattice grid comprises an elastomeric material and machine direction yarns.
95. The arrangement of claim 85, wherein the at least one first fabric transports the paper web to and from the press arrangement.
96. The arrangement of claim 85, wherein the at least one first fabric comprises a three-dimensional structure, whereby the press arrangement processes a high bulky web.
97. The arrangement of claim 85, wherein the at least one second fabric is capable of storing or absorbing water.
98. The arrangement of claim 85, wherein the at least one second fabric comprises at least one smooth surface.
99. The arrangement of claim 85, wherein the at least one second fabric comprises a felt with a batt layer.
100. The arrangement of claim 99, wherein a diameter of batt fibers of the batt layer may one of: equal to or less than 11 dtex; equal to or less than 4.2 dtex; and equal to or less than 3.3 dtex.

101. The arrangement of claim 85, wherein the at least one second fabric comprises one of: a blend of batt fibers; and a vector layer which contains fibers which are equal to or greater than approximately 67 dtex.
102. The arrangement of claim 85, wherein a specific surface of the at least one second fabric comprises one of: equal to or greater than  $35 \text{ m}^2/\text{m}^2$  felt area; equal to or greater than  $65 \text{ m}^2/\text{m}^2$  felt area; and equal to or greater than  $100 \text{ m}^2/\text{m}^2$  felt area.
103. The arrangement of claim 85, wherein a specific surface of the at least one second fabric comprises one of: equal to or greater than  $0.04 \text{ m}^2/\text{g}$  felt weight; equal to or greater than  $0.065 \text{ m}^2/\text{g}$  felt weight; and equal to or greater than  $0.075 \text{ m}^2/\text{g}$  felt weight.
104. The arrangement of claim 85, wherein a density of the at least one second fabric comprises one of: equal to or higher than  $0.4 \text{ g/cm}^3$ ; equal to or higher than  $0.5 \text{ g/cm}^3$ ; and equal to or higher than  $0.53 \text{ g/cm}^3$ .
105. The arrangement of claim 85, wherein the press arrangement operates a web speed of greater than 1000 m/min.
106. The arrangement of claim 85, wherein a permeability of the at least one second fabric is one of: lower than approximately 80 cfm; lower than approximately 40 cfm; and equal to or lower than approximately 25 cfm.
107. The arrangement of claim 85, wherein a permeability of the at least one second fabric is lower than a permeability of the at least one first fabric.



108. The arrangement of claim 85, wherein a compressibility of the at least one second fabric is greater than a compressibility of the at least one first fabric.
109. The arrangement of claim 85, wherein the support surface generally flat or generally planar.
110. The arrangement of claim 85, wherein the support surface comprises a curved surface of a suction roll or cylinder.
111. The arrangement of claim 110, wherein the curved surface of the suction roll or cylinder comprises one of a diameter of approximately 1 m or more and a diameter of approximately 1.2 m or more.
112. The arrangement of claim 110, wherein the suction roll or cylinder comprises at least one suction zone.
113. The arrangement of claim 85, wherein the mechanical pressure is produced by at least one of tensioning of the pressure producing element and compressing exerted by the pressure producing element.
114. The arrangement of claim 85, wherein the pressure producing element comprises an impermeable belt.
115. The arrangement of claim 85, wherein the pressure producing element comprises a permeable belt.
116. The arrangement of claim 85, wherein the pressure producing element

comprises one of a press shoe and a perforated press shoe.

117. The arrangement of claim 85, wherein the pressure producing element comprises a press roll.
118. The arrangement of claim 85, wherein the pressure producing element comprises a permeable belt having an open area which comprises one of: at least approximately 25%; greater than approximately 35%; greater than approximately 50%.
119. The arrangement of claim 85, wherein the pressure producing element comprises a permeable belt having a contact area which comprises one of: at least approximately 10%; at least approximately 25%; and up to approximately 50%.
120. The arrangement of claim 85, wherein the pressure producing element comprises a permeable belt having a tension which comprises one of: more than approximately 30 KN/m; and more than approximately 50 KN/m.
121. The arrangement of claim 85, wherein the differential pressure is one of: greater than approximately 0.3 bars; equal to or greater than approximately 1 bar; and approximately 1.5 bar.
122. The arrangement of claim 85, wherein the pressure producing element comprises a permeable belt which comprises one of a reinforced plastic or synthetic material belt and a spiral linked fabric.
123. The arrangement of claim 85, further comprising a device for producing an

overpressure above the pressure producing element.

124. The arrangement of claim 85, further comprising a device for producing hot air or steam above the pressure producing element.
125. The arrangement of claim 85, wherein at least one of the at least one second fabric and the at least one first fabric is heated.
126. The arrangement of claim 86, wherein the paper web leaves the press arrangement with a moisture content of approximately 35% or less.
127. The arrangement of claim 85, wherein the paper web leaves the press arrangement with a dryness level of between approximately 30 to approximately 40%.
128. The arrangement of claim 85, wherein a dynamic stiffness  $K^*$  [N/mm] of the at least one second fabric greater than or equal to 3,000 N/mm and less than a dynamic stiffness  $K^*$  [N/mm] of the at least one first fabric.
129. A method of drying a paper web in a press arrangement of claim 85, the method comprising:  
moving the paper web, disposed between the at least one first and second fabrics, between the support surface and the pressure producing element;  
and  
moving a fluid through the paper web, the at least one first and second fabrics, and the support surface.

130. A belt press for a paper machine, the belt press comprising:  
a vacuum roll comprising an exterior surface and at least one suction zone;  
a permeable belt comprising a first side and being guided over a portion of  
said exterior surface of said vacuum roll;  
said permeable belt having a tension of at least approximately 30 KN/m; and  
said first side having an open area of at least approximately 25% a contact  
area of at least approximately 10% , preferably of at least 25 % .
131. The belt press of claim 13 0, wherein said at least one suction zone  
comprises a circumferential length of between app roximately 200 mm  
and approximately 2,500 mm.
132. The belt press of claim 13 1, wherein said circumferential length defines an  
arc of between approximately 80 degrees and approximately 180 degrees.
133. The belt press of claim 13 2, wherein said circumsferential length defines an  
arc of between approximately 80 degrees and approximately 130 degrees.
134. The belt press of claim 13 0, wherein said at least one suction zone is  
adapted to apply vacuum for a dwell time which is equal to or greater than  
approximately 40 ms.
135. The belt press of claim 13 4, wherein said dwell time is equal to or greater  
than approximately 50 ms.
136. The belt press of claim 13 0, wherein said permeable belt exerts a pressing  
force on said vacuum roll for a first dwell time which is equal to or greater

than approximately 40 ms.

137. The belt press of claim 13 6, wherein said at least one suction zone is adapted to apply vacuum for a second dwell time which is equal to or greater than approximately 40 ms.
138. The belt press of claim 13 7, wherein said second dwell time is equal to or greater than approximately 50 ms.
139. The belt press of claim 13 8, wherein said first dwell time is equal to or greater than approximately 50 ms.
140. The belt press of claim 13 0, wherein said permeable belt comprises at least one spiral link fabric.
141. The belt press of claim 14 0, wherein said at least one spiral link fabric comprises a synthetic material.
142. The belt press of claim 14 0, wherein said at least one spiral link fabric comprises stainless steel.
143. The belt press of claim 14 0, wherein said at least one spiral link fabric comprises a tension which is between approximately 30 KN/m and approximately 80 KN/m.
144. The belt press of claim 14 3, wherein said tension is between approximately 35 KN/m and approximately 70 KN/m.

145. A method of pressing and drying a paper web, the method comprising:  
pressing, with a pressure producing element, the paper web between at least  
one first fabric and at least one second fabric; and  
simultaneously moving a fluid through the paper web and the at least one  
first and second fabrics.
146. The method of claim 145, wherein said pressing occurs for a dwell time which  
is equal to or greater than approximately 40 ms.
147. The method of claim 146, wherein said dwell time is equal to or greater than  
approximately 50 ms.
148. The method of claim 145, wherein said simultaneously moving occurs for a  
dwell time which is equal to or greater than approximately 40 ms.
149. The method of claim 148, wherein said dwell time is equal to or greater than  
approximately 50 ms.
150. The method of claim 145, wherein said pressure producing element  
comprises a device which applied a vacuum.
151. The method of claim 150, wherein said vacuum is greater than approximately  
0.5 bar.
152. The method of claim 151, wherein said vacuum is greater than approximately  
1 bar.

153. The method of claim 152, wherein said vacuum is greater than approximately 1.5 bar.